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Fast or Slow, How Long Can Snakes Grow?

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In a previous issue of the *Bulletin of the Chicago Herpetological Society*, Barker et al. (2012) reviewed numerous estimates for the maximum recorded length of pythons and concluded that many of these estimates are unexplained (i.e., presented without identifying a source or specimen), or are based on measurements of questionable validity. Barker et al. (2012) reported that the largest confirmed total length for a captive reticulated python, *Malayopython reticulatus,* was a Pittsburgh Zoo resident aptly named "Colossus," who grew to an "immense" 6.35 m (20 ft 10 in). Barker et al. (2012) also reported that the largest confirmed total length for a captive Burmese python, *Python bivittatus*, was the amusingly named "Baby," who grew to a "gigantic" 5.74 m (18 ft 10 in). In a more recent issue of the *Bulletin*, Ehrsam and Barker (2022) reported on reticulated python specimens in the Natural History Museum of Denmark (Copenhagen) and in the Museum of Natural History, Basel, with total lengths of 7.10 m (23 ft 4 in) and 6.38 m (20 ft 11 in), respectively.

To understand whether these specimens represent the maximum possible body size in pythons, mathematical modeling may be used. A common, taxon-wide method for modeling variation in body size growth over ontogeny is the von Bertalanffy growth function (VBGF), which is appropriate for larger reptiles (Avery, 1994), including snakes (Shine and Charnov, 1992). In the present study, growth over ontogeny data on 200 captive-bred *P. bivittatus* were taken from Taggart et al. (2021). The VBGF was fitted to these data to obtain best-fit parameters for the asymptotic (ultimate) length and growth coefficient for this species. Code and data are made freely available online (Foxon, 2023).

Across all 200 specimens (1,093 observations), the average asymptotic length was 2.4 m (7 ft 9 in; 95% confidence interval: 2.3–2.4 m [7 ft 6 in–7 ft 12 in]), which is relatively small. However, we are not interested in averages; we are interested in outlier snakes, the Colossus kind. Restricting the analysis to just the largest specimen in the study from Taggart et al. (ID138, female) yields an asymptotic length of 3.7 m (12 ft 3 in; 95% confidence interval: 1.1–6.4 m [3 ft 8 in–20 ft 10 in]). The upper 95% confidence level of 6.4 m (20 ft 10 in) is in excellent agreement with "Baby" (5.74 m [18 ft 10 in]; *P. bivittatus*), "Colossus" (6.35 m [20 ft 10 in]; *M. reticulatus*), and the Basel specimen (6.38 m [20 ft 11 in]; *M. reticulatus*), but not the Copenhagen specimen (7.10 m [23 ft 4 in]; *M. reticulatus*). This may suggest that 6.4 m (20 ft 10 in) is a valid approximation for the largest physical length *P. bivittatus* can attain, but that the upper limit of length for *M. reticulatus* may exceed that of *P. bivittatus*. Future studies should extend these findings using growth-over-ontogeny data for the reticulated python specifically to better understand the upper limits of growth in that species.

Either way, this result does not bode well for claims of extraordinarily large extant snakes. Indeed, stories in South American folklore of the *sucuriju gigante,* and reports from officials of the Brazil-Columbia Boundary Commission of snakes purportedly measuring 30 m (115 ft) in total length (Heuvelmans, 1965), appear practically impossible when growth patterns for known snake forms are applied; if 30 m (115 ft) was the asymptotic length of Colossus, then the VBGF equation with the best-fitting growth constant for pythons suggests that he would have had to grow to 6.35 m (20 ft 10 in) by age 0.2 years. Colossus was in captivity for 14 years and did not exceed 6.35 m (20 ft 10 in) despite reportedly consuming more than 68 pigs, totaling 1,991 lbs of food (Barker et al., 2012).

To this author's knowledge, the longest wild *P. bivittatus*, captured on 10 July 2023, had a total length of 5.80 m (19 ft) (Conservancy of Southwest Florida, 2023). Perhaps this explains why so many published estimates for the maximum possible physical length of snakes are unsupported; they are simply not statistically likely.

Of course, even the largest extant snakes are dwarfed by extinct forms (Rivas, 2023); newborn titanoboas, *Titanoboa*

cerrejonensis, are thought to have measured 2.0 m (6 ft 7 in), and adults of this species are thought to have exceeded 10 m (32 ft 10 in).

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